RESEARCH PAPER

Extraction and Evaluation of Tridax Procumbensherbal Cream for Antimicrobial and Anti-Inflammatoty Activity

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ABSTRACT

The present study focuses on the extraction and evaluation of Tridax procumbens leaves for their antimicrobial and anti-inflammatory properties, with the goal of formulating a stable and effective herbal cream. Tridax procumbens, traditionally used in Ayurveda, is known for its rich content of bioactive compounds such as flavonoids, alkaloids, tannins, and terpenoids, which contribute to its therapeutic effects. In this project, both ethanolic and aqueous extracts of the plant were prepared and incorporated into a cream base. The formulated cream underwent physicochemical evaluation including pH, viscosity, and spreadability, along with biological screening for antimicrobial and anti-inflammatory activities. The antimicrobial efficacy was assessed using zone of inhibition methods against bacterial and fungal strains, while anti-inflammatory potential was evaluated through suitable laboratory tests. Results indicated that the ethanolic extract showed comparatively higher biological activity. The final formulation was found to be stable, safe, and effective, highlighting the potential of Tridax procumbens-based herbal cream as a natural alternative for the treatment of skin infections and inflammation.

Keywords: Tridax procumbens, herbal cream, antimicrobial activity, anti-inflammatory activity.

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INTRODUCTION

Herbal medicines are gaining increasing attention due to their safety, accessibility, and therapeutic potential. Among various medicinal plants, Tridax procumbens (commonly known as coat button) has been traditionally used in Ayurveda for treating wounds, infections, and inflammation. The plant is rich in bioactive constituents such as flavonoids, alkaloids, tannins, and terpenoids that contribute to its antimicrobial and anti-inflammatory properties. In modern research, herbal formulations like creams have emerged as effective topical delivery systems for natural extracts, offering localized action with minimal side effects. Hence, this study focuses on the extraction of Tridax procumbens leaves and the formulation of an herbal cream to evaluate its antimicrobial and anti-inflammatory potential.

Motive of present research work is-

1. To extract bioactive compounds from *Tridax procumbens* leaves using ethanolic and aqueous solvents.
2. To formulate a stable herbal cream incorporating both extracts.
3. To evaluate the physicochemical parameters of the formulated cream (pH, viscosity, spreadability, and stability).
4. To assess the antimicrobial activity of the extracts and formulated creams against selected bacterial and fungal strains.
5. To determine the anti-inflammatory potential of the extracts and formulations using in-vitro models.

Figure No 1: *Tridax procumbens*

Plant profile:

Kingdom-Plantae,

Division-Spermatophyta,

Class-Magnoliopsida,

Family-Asteraceae

Genus-Tridax

Species-Procumbens

MATERIAL AND METHODS:

Selection of plant material

Selection of plant material based on extensive literature survey reveals that plant TridaxProcumbence leaves have preferable antioxidant, antimicrobial and anti-inflammatory Activity as well as other potent activities for against diseases.

Plant collection and identification

Tridax Procumbens plants fresh leaves collected from local region of Latur.Plant material was collected from the local farm. After the selection of plant some steps

Are followed:

• Plucking the leaves from plant.

• Picking the clean leaves of plant.

• Leaves are rinse with the water to remove dust particles.

• Washed leaves kept for shed drying on a filter paper at room temperature. After drying

Powdered the leaves with the help of grinde

Extraction method

Figure No 2: Extract of *Tridax Procumbens*

Maceration method

The extract of the Tridax Procumbens leaves were prepared by maceration process. Firstly, the collected Tridax Procumbens leaves were washed with tap water followed by Deionized water. The dried Tridax Procumbens leaves was blended into the grinder until Fine chopped pieces formed. The extract of the Tridax Procumbens leaves were prepared by maceration process. 50 g of Tridax Procumbence leaves powder were extracted with 500 mL distilled water and to kept in a maceration apparatus for 72 hours. After 72 hours the filtration of extract was done. Then the remaining solvent evaporated by hot plate. And finally, the extracts were collected into a sterilized bottle and stored in refrigerator until further use.

Soxhlet extraction method

Figure No 3: Soxhlet extraction of *Tridax Procumbens*

Theextract of the Tridax Procumbens leaves were prepared by Soxhlet process. Firstly, the collected Tridax Procumbens leaves were washed with tap water followed by Deionized water. The shady dried Tridax Procumbens leaves was blended into the grinder until fine chopped pieces formed.Weigh 50 g of this powder for the extraction process.Fill 50 g of Tridax procumbens powder into a cellulose extraction thimble or wrap it In Whatatman filter paper to make a secure pouch. Place the thimble in the main Chamber of the Soxhlet extractor Add 500 mL of ethanol into a clean round-bottom flask. Connect the flask to the Soxhlet extractor containing the thimble. Attach a condenser to the top of the Soxhlet Unit. Ensure all joints are sealed properly. Place the round-bottom flask on a heating mantle or water bath. Maintain the temperature at 75°C throughout the process.Allow ethanol to boil gently. Vapors rise, condense in the condenser, and drip onto the thimble. The solvent dissolves the active constituents and siphons back into the flask.Continue this process for 72 hours for exhaustive extraction.After extraction, cool the apparatus and dismantle it safely.Filter the extract if any solid residues are present.Concentrate the ethanolic extract using by simple evaporation on a water bath.Dry the residue in a hot air oven until constant weight is obtained.

An 8% yield of ethanolic extract of Tridax procumbens was obtained after 72 hours Of Soxhlet extraction at 75°C using ethanol as the solvent

Procedure of herbal cream:

1. Preparation of the Oil Phase: Take the required quantities of Cetyl alcohol, liquid paraffin, and petroleum jelly and Melt them together in a beaker by heating in a water bath at about 70–75°C.
2. Preparation of the Aqueous Phase: In a separate beaker, dissolve Tween 80, methyl paraben, and the plant extract (aqueous Extract or ethanolic extract) in purified water. Heat the aqueous phase also to 70–75°C to match the temperature of the oil phase.
3. Emulsification: Slowly add the aqueous phase to the oil phase with continuous stirring using a Mechanical stirrer or homogenizer. Stirring should be vigorous to ensure the formation of A uniform emulsion. Maintain the temperature during mixing to prevent premature Solidification.
4. Cooling and Final Mixing:After complete addition and emulsification, allow the mixture to cool gradually to room Temperature while continuously stirring slowly to maintain uniformity and prevent air Bubble formation. Add 2 or 3 drop the lemon oil by dropper for flavour.
5. Filling and Storage: Once cooled, the cream is transferred into clean, labelled containers and stored at room temperature for further evaluation.

Formulation Table

Sr No	Ingredient	F1	F2	F3
1	Cetyl alcohol	10 gm	8 gm	10 gm
2	Liquid paraffin	9 ml	7ml	7ml
3	Petroleum jelly	5 gm	4 gm	4 gm
4	Extract	0.5 gm	1 gm	1.5 gm
5	Methyl paraben	0.02 gm	0.02 gm	0.02 gm
6	Tween 80	2 ml	2 ml	2 ml
7	Water	qs	qs	qs
8	Lemon oil	-	-	-

Aqueous Extract Containing Formulation

Sr No	Ingredient	F1	F2	F3
1	Cetyl alcohol	10 gm	8 gm	10 gm
2	Liquid paraffin	9 ml	7 ml	7 ml
3	Petroleum jelly	5 gm	4 gm	4 gm
4	Extract	0.5 gm	1 gm	1.5 gm

5	Methyl paraben	0.02 gm	0.02 gm	0.02 gm
6	Tween 80	2 ml	2 ml	2 ml
7	Water	qs	qs	qs
8	Lemon oil	-	-	-

Antimicrobial activity:

Sterilized nutrient agar medium was cooled to 45–50°C and poured into sterile Petri plates. After solidification, bacterial strains (E. coli, Staphylococcus aureus, and Candida albicans) were inoculated uniformly using sterile loops. Wells were made in the agar using a sterile cork borer, and different concentrations of test extracts or formulations were loaded (e.g., 100 µL, 500 µL). Plates were incubated at 37°C for 24 hours. Antimicrobial activity was determined by measuring the diameter of the inhibition zones around the wells in millimetres.

Anti-inflammatory activity:

The anti-inflammatory potential of Tridax procumbens leaf extracts was assessed using the protein denaturation inhibition method. Reaction mixtures containing 1 mL of extract at concentrations of 100, 200, and 500 µg/mL were prepared with 3 mL of phosphate-buffered saline (pH 6.5) and 2 mL of egg albumin. The mixtures were incubated at 25°C for 15 minutes and subsequently heated at 65°C for 12 minutes to induce protein denaturation. After cooling to room temperature, absorbance was recorded at 660 nm using a UV–visible spectrophotometer. Double distilled water and ethanol served as blanks for aqueous and ethanolic extracts, respectively. A control (without extract) and diclofenac sodium (standard drug) were processed under identical conditions.

The percentage inhibition of protein denaturation was calculated using the equation:

% of inhibition : (Ac-As)/Ac*100

Where As- absorbance of sample

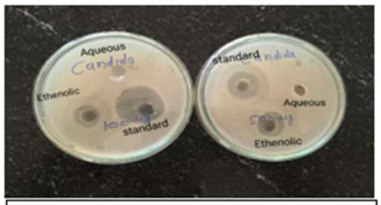
Ac- absorbance of control

RESULT AND DISCUSSION

Antibacterial and antifungal activity

***Staphylococcus aures* zone of inhibition of formulation**

***E coli* zone of inhibition of formulation**

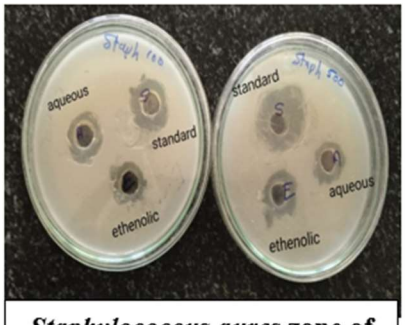


***candida albicans* zone of inhibition of formulation**

Zone of inhibition in mm

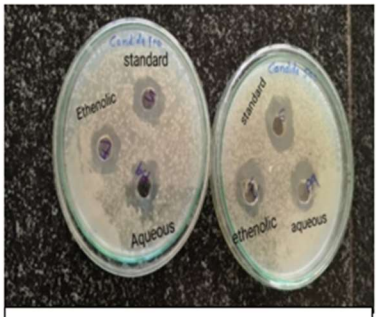
Dose Concentration of extract [50 µl]	**Zone of inhibition in mm**		
	E coli	***Staphylococcus aureus***	***Candia albicans***
Ethanolic	5	4	7
Aqueous	3	3	4
Standard	8	9	12
Dose	**Zone of inhibition in mm**		

Concentration of extract [100 µl]	*E coli*	*Staphylococcus aureus*	*Candia albicans*
Ethanolic	8	7	11
Aqueous	5	5	7
Standard	10	12	15



***Staphylococcus aures* zone of inhibition of extract**

***E coli* zone of inhibition of extract**



***E coli* zone of inhibition of extract**

Dose Concentration of extract [50 µl]	Zone of inhibition in mm		
	E coli	*Staphylococcus aureus*	*Candia albicans*
Ethanolic	6	5	7
Aqueous	4	3	3
Standard	8	9	11
Dose Concentration of extract [100 µl]	**Zone of inhibition in mm**		
	E coli	*Staphylococcus aureus*	*Candia albicans*
Ethanolic	9	8	10

Aqueous	6	5	4
Standard	12	11	14

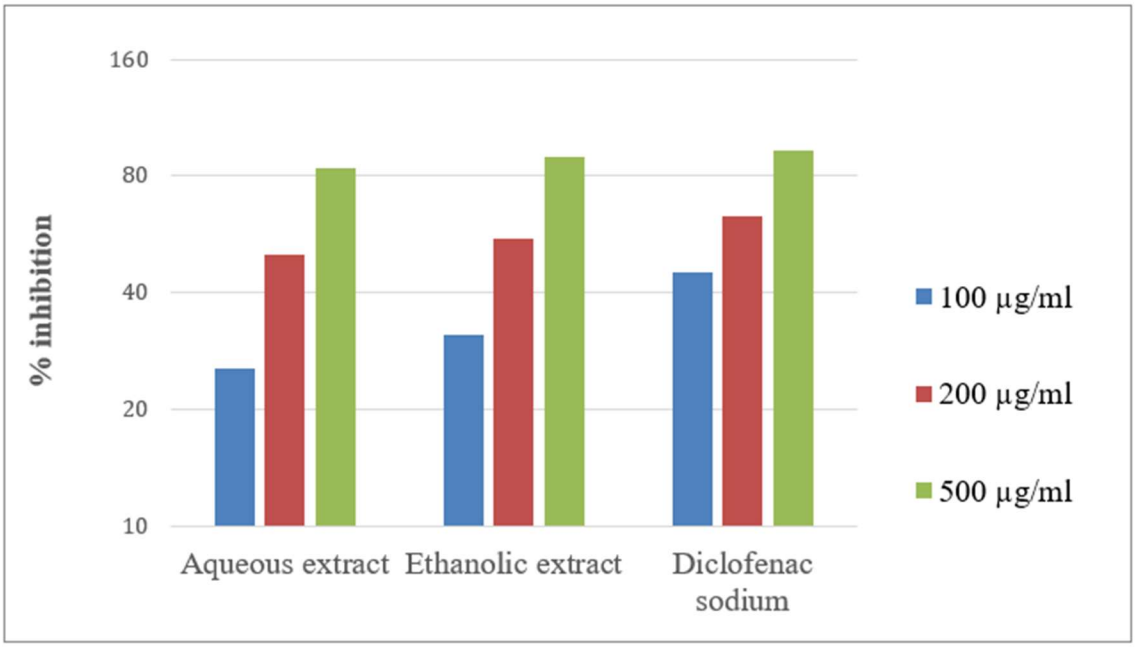
By performing antibacterial and antifungal activities of Tridax procumbens leaves extracts were evaluated using the agar well diffusion method. The results demonstrated that the ethanolic extract exhibited significantly higher antimicrobial activity compared to the aqueous extract. This indicates that the aqueous extract possesses relatively poor antibacterial and antifungal efficacy in comparison to the ethanolic extract.

Among the tested batches, the optimized ethanol extract contained F3 formulation batch exhibited greater antimicrobial activity compared to aqueous extract contained F3 formulation batch.

As well as result of zone of inhibition of Tridax procumbens plant leaves extract demonstrates ethanolic extract contained has more activity compared to aqueous extract

Anti-inflammatory activity

% INHIBITION in µg/ml			
Drug	**100**	**200**	**500**
Tridax Procumbens aqueous extract	25.5	50.2	84.2
Tridax Procumbens Ethanolic extract	31.25	55	90
Diclofenac sodium	45.16	63	93



Anti-inflammatory activity

The in-vitro anti-inflammatory study using the protein denaturation method showed that:both aqueous and ethanolic extracts of *Tridax procumbens* exhibited dose-dependent inhibition of protein denaturation.The ethanolic extract showed higher % inhibition at all

concentrations (100, 200, 500 µg/mL) compared to the aqueous extract, indicating greater anti-inflammatory potential.Diclofenac sodium was used as a standard reference and showed the highest inhibition, as expected.

CONCLUSION

The present study successfully focused on the extraction, formulation, and evaluation of a Herbal cream containing Tridax procumbens leaf extract, aiming to assess its Antimicrobial and anti-inflammatory potential. Phytochemical screening revealed the Presence of essential bioactive constituents in both extracts. These extracts were Subjected to phytochemical screening, confirming the presence of important bioactive Compounds such as flavonoids, alkaloids, and tannins, which are known to contribute to Antimicrobial and anti-inflammatory effects.

The cream was formulated using standard excipients and evaluated for key parameters like appearance, pH, viscosity, spreadability, homogeneity, wash ability, and stability, all of which showed satisfactory results. Biological evaluations revealed that Tridax procumbens leaves

Ethanolic extract Contained formulated cream exhibited significant antibacterial activity against gram-Positive and gram-negative bacteria, and notable antifungal activity against pathogenic Fungi compared to Tridax procumbens aqueous extract contained cream formulation.

As a result, the cream formulated with the ethanolic extract demonstrated more promising Results in terms of antibacterial, antifungal, and anti-inflammatory activities when Compared to the aqueous extract formulationSimilarly the Tridax procumbens leaves ethanolic extract demonstrated effective anti-Inflammatory activity and indicating its potential to reduce inflammation and skin Irritation compared to Tridax procumbens aqueous extract.

The study confirmed that Tridax procumbens possesses strong antimicrobial and anti-Inflammatory properties, and its incorporation into a cream base provides an effective, Natural alternative for managing skin infections and inflammation. This work supports the continued development of plant-based topical formulations as safe, effective, and Accessible therapeutic options in modern herbal medicine.

Authentication of herbal plant

Authentication of herbal plant Tridax Procumbens leaves were done by Professor and Head of Botany, Dr.C.S. Swami Sir, Dayanand Science College Latur.

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